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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
EOM, ROBERT J	
ART UNIT	PAPER NUMBER
1797	

NOTIFICATION DATE	DELIVERY MODE
11/16/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/593,255	SHIN ET AL.	
	Examiner	Art Unit	
	ROBERT EOM	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 25-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8, and 25-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see Applicant's Response, filed 06/29/2009, with respect to the rejection(s) of claim(s) 1-8 under 35 USC 102(b) and 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Scharvitz et al. (A combustion-based MEMS thermoelectric power generator), and Wijngaards et al. (Design and fabrication of on-chip integrated polySiGe and poly Si Peltier Devices).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-8 and 25-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear as to whether the limitation "which are on the membrane" in line 8 of claim 1, is referring to the microheater or the gas sensor. As such, the structural arrangement of the applicant's gas sensor cannot be surmised from the claims. Appropriate corrections are required.

Regarding claim 6, the applicant is advised that the insulating film and the bonding film have not been positively recited in any of the claims, and therefore lack antecedent basis. Additionally, the way claim 6 is presented, causes it to be

a recitation of a method of making the applicant's gas sensor. The examiner notes that the determination of patentability is determined by the recited structure of the apparatus and not by a method of making said structure. For purposes of examining, claim 6 will be examined as if the insulating film and the bonding film were positively recited, however appropriate corrections are required.

Regarding claim 8, the applicant is advised that the SiGe thin film has not been positively recited in any of the claims, and therefore lack antecedent basis. Additionally, the way claim 8 is presented, causes it to be a recitation of a method of making the applicant's gas sensor. The examiner notes that the determination of patentability is determined by the recited structure of the apparatus and not by a method of making said structure. For purposes of examining, claim 6 will be examined as if the SiGe thin film were positively recited (i.e. ...wherein the thermoelectric conversion material film comprises a SiGe thin film), however appropriate corrections are required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-3, 7, and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Scharvitz et al. (A combustion-based MEMS thermoelectric power generator).

Regarding claims 1-3 and 8, Schaevitz discloses thermoelectric device **(Fig. 1 and Fig. 3)** comprising: a thermally insulating silicon nitride membrane formed on a silicon wafer; a silicon-germanium thermoelectric thermopile having a hot junction and a cold junction located on the same membrane **(Fig. 2)**, the thermopile being formed of a plurality of thermocouples connected in series **(pg2/C2/L9-10)**; a catalyst (usually platinum) deposited on the channel side of the membrane and aligned with the hot end of the thermopile; and an integrated electrical heater **(pg3/C2/L6)**.

Regarding limitations recited in claim 7, which are directed to a manner of manufacturing the disclosed gas sensor, the examiner notes that the determination of patentability is determined by the recited structure of the apparatus and not by a method of making said structure. A claim containing a recitation with respect to the manner in which a claimed apparatus is made does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to

be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 4-6, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scharvitz et al. (A combustion-based MEMS thermoelectric power generator), as applied to claims 1-3 above, in view of Wijngaards et al. (Design and fabrication of on-chip integrated polySiGe and poly Si Peltier Devices).

Regarding limitations recited in claim 4, which are directed to a manner of manufacturing the disclosed gas sensor, the examiner notes that the determination of patentability is determined by the recited structure of the apparatus and not by a method of making said structure. A claim containing a recitation with respect to the manner in which a claimed apparatus is made does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim.

Regarding claims 4 and 5, Scharvitz discloses all of the claim limitations as set forth above. Scharvitz further discloses that the membrane is formed by KOH etching the backside of the silicon wafer **(pg3, see: Fabrication)**, and a plurality of membranes being provided on the silicon wafer **(Fig. 1a)**.

Scharvitz does not explicitly disclose the membrane having a thickness of 1 μm or less. However, as the heat transfer rate and the temperature gradient are variables that can be modified, among others, by adjusting said thickness of the membrane, with said heat transfer rate and the temperature gradient both increasing as the membrane thickness is decreased, the precise membrane thickness would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed membrane thickness cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the thickness of the membrane in the device of Scharvitz to obtain the desired said heat transfer rate and the temperature gradient (In re Boesch, 617 F.2d. 272, 205

USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (In re Aller, 105 USPQ 223).

Wijngaards teaches a polySiGe Peltier device with a membrane formed by backside KOH etching, consisting of a 200 nm/300 nm SiN/SiO2 stack **(pg 320, see: Fig. 4; and 4.2 Fabrication results)**.

Since the instant specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a membrane with a thickness of 1 μm or less in the device of Schaevitz, as taught by Wijngaards, since such a modification would have involved a mere change in the size (or dimension) of a component. A change in size (dimension) is generally recognized as being within the level of ordinary skill in the art. In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). Where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device, and the device having the claimed dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device, Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Regarding claims 6, 25, 57, and 28, Scharvitz discloses all of the claim limitations as set forth above. Scharvitz further discloses a TiN barrier layer being PVD on the SiN membrane; and a Pt metallization layer e-beam deposited on the barrier layer **(Fig. 3; pg3, see: Fabrication)**.

Scharvitz does not explicitly the integrated heater being bonded to the insulating film by the bonding film. The thermoelectric conversion material extending in a linear section: from a first periphery of the membrane where the catalyst is disposed, to a second periphery of the membrane where the microheater is disposed. The microheater further being in thermal contact with the catalytic material layer, and being electrically insulated by the insulating film.

Wijngaards teaches a polySiGe Peltier device **(Fig. 4 and Fig. 5)** with resistors for heating and temperature measurement disposed on the Al Metallization layer near the outer periphery of the membrane/thermopile areas **(see: epi mass border)**.

It would have been obvious to one having ordinary skill in the art at the time of the invention to form the integrated heater on the peripheral Pt metallization layer in the device of Scharvitz, as taught by Wijngaards, since doing so would provide for a temperature stabilized micro-platform which would have further versatility in being applicable to automotive (combustion) gas sensing **(Wijngaards: pg321, see: 5.1. Thermal stabilization of on-chip references)**, as well as provide for control of the output electrical power of the thermoelectric generator (since electricity is generated by the thermal gradient produced by the catalytic reaction of gases, disposing the heaters at the side of the membrane opposite of the catalytic material and near the periphery of the membrane where the substrate is thickest, would provide the most direct and precise control of the thermal gradient in the thermoelectric material film).

Regarding limitations recited in claims 26 and 29, which are directed to a manner of operating disclosed sensor, it is noted that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT EOM whose telephone number is (571)270-7075. The examiner can normally be reached on Mon.-Thur., 9:00am-5:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tony G Soohoo/
Primary Examiner, Art Unit 1797

/R. E./
Examiner, Art Unit 1797